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# DATAMATION®

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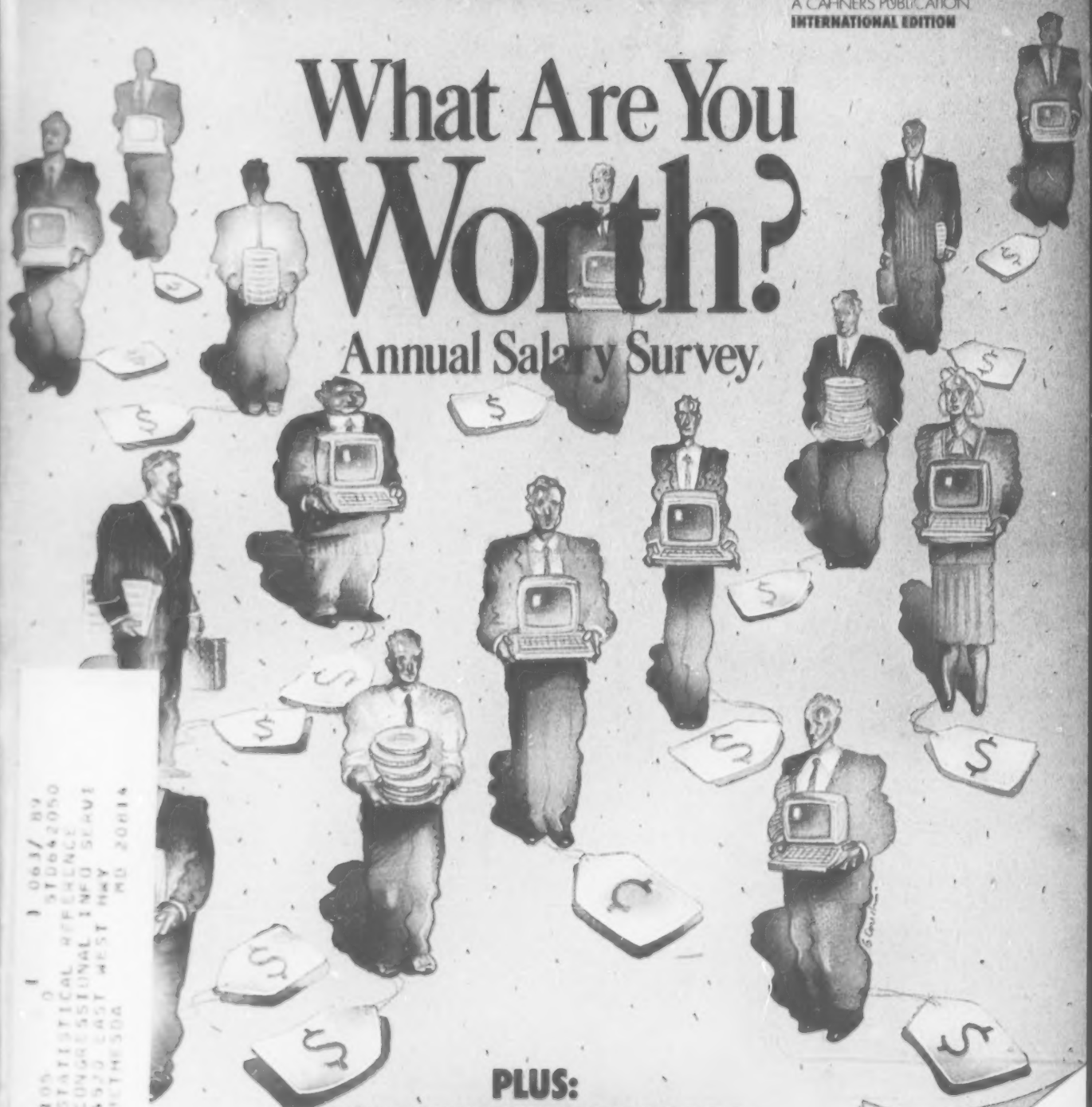

# What Are You Worth?

## Annual Salary Survey

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**PLUS:**

**THE LONG SHADOW OF DB2**

**WHAT USERS THINK OF UNIX**

**SEVEN RULES OF GLOBAL NETWORKING**

KEEPING AMERICA COMPETITIVE
**A SPECIAL REPORT**

# DATAMAT

## NEWS


9 **Look Ahead**
DB2 user group heads were scheduled to meet to try to form a national group.

17 **Service**
Recurring VAX 8700 crashes lead users to question DEC's support and its ability to erode IBM's user base, Gary McWilliams reports.

19 **Networks**
Jeff Moad explores IBM's removal of SNA protocols from the public domain amid concern that it will limit non-IBM customer access.

22 **Taxation**
Susan Kerr writes that state tax agencies are targeting custom software, sending users in search of offsetting discounts.

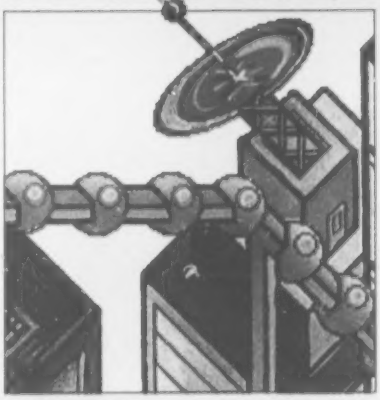
28 **Software**
Leading banks are teaming up with software suppliers in joint development efforts. Bob Francis investigates the mutual benefits.

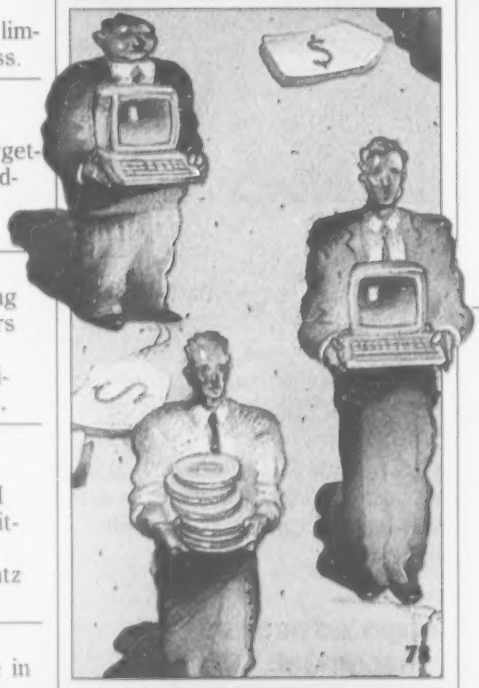
32 **R&D**
A congressional funding proposal has NSF Phase II supercomputer centers pitted against their Phase I predecessors. Willie Schatz reports.

35 **Benchmarks**
IBM has reduced its stake in Intel to 7.1%.

39 **STAFF REPORT**
**Behind the News**
How competitive is the U.S. computer industry? DATAMATION examines the industry's standing in five important product areas and probes its health as diagnosed in Washington and Tokyo. Also reported are the results of an exclusive poll of readers' perceptions of U.S. competitiveness.


## FEATURES





68 **The Golden Rules of Global Networking**
BY GEOFF WIGGIN
For a network manager setting up a global network, it's either a world of pleasure caused by a successful strategy or a world of tears over a very expensive disaster. These rules will help to determine which world will be yours.

78 **What Are You Worth?**
BY PARKER HODGES
Money can't buy you love, but DATAMATION's salary survey shows that IS pros, with overall average raises of 5.8% last year, could purchase 4.1% more of anything else than they could the year before. See how your salary stacks up against the average for your job and geographic area.

97 **Unix: What Users Are Saying**
BY MARY JO FOLEY AND DON LEAVITT
Unix, once expected to be merely a software developer's tool, is now turning up in an array of applications. Four users at multivendor shops offer their views of its pros and cons. Also, the Posix standard's potential to heal some of Unix's ills is explored.

110 **The Long Shadow of DB2**
BY EDITH D. MYERS
What feelings about DB2 lurk in the hearts of users? Their kudos, particularly for SQL, are the envy of independent database vendors, who now seem to be saying, "If you can't beat 'em, join 'em," hoping to ride into shops on the IBM product's coattails.

# ION

REAL TIME


4 **Letters**
A Floating Point Systems designer comments on a misconception; a reader describes his dislike for Unix.

119 **Hardware**
Prime Computer Inc.'s new supermini debuts.

125 **Software**
New DB2 tools from Updata Software.

133 **Advertisers' Index**

133 **The Marketplace**

137 **People**
Computer Sciences' Jose Collazo takes a global view.

141 **Books**
*Manufacturing For Competitive Advantage* by Thomas G. Gunn is reviewed.

141 **Calendar**
World Conference on Electronic Printing and Publishing.

145 **Readers' Forum**
Louise E. Scott reveals an untapped resource.


INTERNATIONAL 76-1

Does not appear in all copies.


-1 **Volvo's Net Gains**
BY JOHN LAMB
The Swedish automaker drives a complex global network that is essential to its success.

-13 **Telecom '87: Crisis and Convergence in Geneva**
BY PETER PURTON
For the first time, computer makers and telecom manufacturers will have equal space at Telecom '87.

-21 **Japan's TRON Tactics**
BY ROBERT POE
The first TRON OS products are on the way amid Japanese enthusiasm.

-26 **Counting the Cost of ISDN**
BY CHRIS BUCKLEY
The question is, what's ISDN worth?


Cover Illustration by Greg Couch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NUMBER 19

1987 JESSE H. NEAL AWARD

## Editorial

# Competitiveness: The Challenge Is Yours

The challenge of keeping America competitive, as well as the task of keeping up with America, falls squarely on you—the executives and professionals who manage IS for the nation's companies, institutions, and agencies. Everybody, from the ceo to the clerk, is counting on you to choose and run the systems that will create and sustain a competitive advantage for their enterprises in the world marketplace.

Such an advantage is sought in nearly every sector of the information business. Manufacturers demand factory automation solutions that will lower production costs. Government agencies insist on communications networks that will improve their efficiency. University heads require state-of-the-art computing environments that will attract the best and brightest professors and students. All are motivated by a single goal: to improve the standard of living for their constituencies—be they shareholders, taxpayers, or society in general.

The challenge is made all the more difficult by nationalistic sentiments. Should you buy products and services only from vendors headquartered in your native country? Or should you choose the best systems and software, regardless of their country of origin?

The choice is not an easy one to make, as reflected in the responses of customers and vendors interviewed in the course of compiling this issue's special report on U.S. competitiveness (p. 39). "My role is to get the most cost-effective solution to a business problem. If that means an NEC drive, so be it," says an MIS director at Morton Thiokol Inc. "Can we afford to let everything go?" worries the chairman of U.S.-based vendor Harris Corp., who has seen his company resort to offshore sourcing in computer terminals and some communciations equipment in order to stay competitive.

You have an obligation to your employer to see that it buys the best information technology products—whether they are from North America, Asia, or Europe. But you also owe it to your company to devise an intelligent purchasing strategy—one that takes into account more than just pricing. You must consider how much different vendors are spending on R&D, what level of service and support can be expected, and the longevity of the product line.

Such a strategy only stands to make your organization more competitive.

Tim Mead

TIM MEAD
EDITOR-IN-CHIEF

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# Letters

## Misconception

As one of the principal designers of the Floating Point Systems' T Series parallel supercomputers, I feel both qualified and compelled to correct a prevalent misconception about the machine, one that is reflected in a recent Look Ahead item (July 15, p. 12).

While the Inmos Transputer chip is a most critical element of the machine, and Inmos gave prompt and thorough support in order to help us in the use of their excellently engineered and nearly indispensable computer, major products of other companies are also essential parts of the machine. These companies also gave great assistance in helping us design with their new and innovative parts, none of which was available when the design was started.

Weitik 64-bit floating point multipliers and accumulators give the machine its fast floating point arithmetic, which peaks at 16MFLOPS per node. Texas Instruments supplied memory and a most flexible micro sequencer, both of which provide for the full use of the speed of the arithmetic parts. The use of higher-performance Weitek parts was designed long before the original chips were even available. Higher-speed Texas Instruments memory was also planned long in advance. Faster parts from any or all of these companies can be incorporated with either minor or no changes in design or to the boards. For example, the new floating point Transputer, just coming on the market, will increase performance in several ways.

The installation of one of the largest—if not the largest—computers in the world, a T-100, seems also to have been the computer media's biggest nonevent. A 128-node T-100 with 16MFLOPS peak per node for a total of 2.05GFLOPS peak and a possible effective performance of three fourths of that speed, was installed this year at Los Alamos, N.M.

This machine is, as are all other T Series computers, expandable, without any change, to a maximum of 16,384 nodes or 200,000,000,000FLOPS. The standard connectors already installed on every cabinet, as well as the standard cables delivered with every cabinet, already allow for such an expansion, but a large, specially designed building, more properly termed a metacabinet, is required.

ROBERT F. BENNION
Computer System Architects
Provo, Utah

## Inappropriate

I appreciated very much the Readers' Forum by Daniel P. Dern, (June 15, p. 174) explaining why he likes Unix. It was full of a contagious sense of fun, and crystal clear in its presentation of his reasons for liking Unix. The revelation for me was that these are the same reasons I would use to say why I don't like Unix. (Different men swear by and at jockey shorts for exactly the same reasons.)

Even after 18 years at the keyboard, I find myself strongly aligned with the other (or is it just *an*other?) large, legitimate group of computer users: those who appreciate, perhaps even need, "user-friendly" behavior from their tools. To call an operating system "a tinkerer's delight," a challenging amusement that makes "Adventure" pale by comparison; to describe its rules as "so copious that you can't digest it all," with learning driven by mistakes; to describe it as "a box full of mysterious powers" that "increase your chances of creating new and more esoteric technical disasters" is to scare the daylights out of us.

There, I've said it. Unix scares me. Its command names *are* cryptic, it *is* "a continual gedankenexperiment," it *does* take Sherlock Holmes to figure out what it did with your data. To say that these criticisms may be muted because Unix was not developed for the casual end user is to miss the blind promotion of Unix in some quarters as the be-all and end-all. It is neither (and Mr. Dern did not say it was.) Maybe AT&T has recognized the two-edged nature of this thing called Unix, and that is why they are sometimes such reluctant parents.

I am not saying that Unix is wrong, just that it is inappropriate for many users. Those of its champions who insist on installing it in inappropriate places (the office environment, for instance), without an ameliorating shell or interface, will eventually fade away without any push from me. Those of its champions who use it well and properly will forever drop my jaw in astonishment at what they can do "on the fly." I do, however, make a plea for intelligent discrimination, and for tools that are all the more powerful because they are clear, all the more elegant because they are simple, all the more usable because they are friendly and consistent. Surely there is room for both kinds. Surely I should have a choice.

JOHN A. TROTTER JR.
Abacus Programming Corp.
Van Nuys, California

RESEARCH & DEVELOPMENT

# NSF Supercomputer Centers Embroiled in Funding Dispute

## The House has proposed continued funding for Phase I centers, which has Phase II users—who say they are barely surviving on current funding levels—up in arms.

BY WILLIE SCHATZ

For entities that were supposed to have been history this year, the National Science Foundation's Phase I supercomputer centers are really hanging in there.

The proposed continued funding of Phase I centers, however, has university scientists wondering about the present and future course of the NSF's advanced scientific supercomputing program. If Congress resurrects Phase I centers at the expense of Phase II centers, these scientists say, their ability to conduct advanced research and purchase state-of-the-art supercomputers will be severely hindered.

You remember the Phase I centers. They're the supercomputer facilities at the University of Minnesota, Colorado State University, and Purdue University from which the NSF was buying cycle time for its researchers back in the dark ages of 1984. When the NSF developed its advanced scientific computing initiative and established what it called Phase II centers that same year, part of the deal was that the agency's monetary support for those three Phase I centers would gradually fade to nothing.

Earlier this year, NSF canceled funding for Phase I centers (see "Render Unto Caesar," March 1, p. 19). Since then, the centers have eked out a subsistence from non-NSF funding sources.

Now, they're back, with funding to the tune of $3.5 million. That's what the House Appropriations Committee proposed this summer in its funding bill for fiscal year 1988. And Phase II center directors are howling.

"We've got a real crisis on our hands," says Larry Smarr, director of the NSF's Phase II National Center for Supercomputing Applications at the University of Illinois, Champaign. "Someone in the country has to stand up and take extraordinary action. If Congress and the NSF follow business as usual, they might as well shut the Phase II centers right now.

"The next six months is make-or-break time," Smarr emphasizes. "There's going to have to be a restructuring of the whole program. Otherwise you're going to see the painful dying away of the Phase II centers within a year."

Smarr and others are miffed because the proposed continued Phase I funding comes at a time when budget pressures are causing a lack of cooperation between Phase II centers. Says Sid Karin, director of the Phase II San Diego Supercomputer Center, "There could be much more [work done] than we're doing. But the system says, hey, don't go too far. That lack of cooperation negatively affects the centers."

### Competing with Each Other

Even though all the centers have the same NSF advanced scientific computing mission, they must compete with each other for a very finite number of dollars. The House appropriation bill, subject to Senate approval, reduces NSF's $1.89 billion budget request by $50 million. Of the proposed $1.84 billion for NSF, $51.7 million is set aside for the advanced scientific computing program, under which the supercomputer centers fall. And the bill states that the NSF should use $3.5 million for the Phase I centers.

The House committees' moves have left a very bad taste in a very large number of mouths. "They set this aside by pure pork barrel," says the director of a Phase II center who requested anonymity. "If they pass this, it's an absolute scandal. It's criminal."

While Phase II supporters were distressed that science was no more exempt from pork barreling than any other government program, Phase I supporters in the legislature claimed to be merely protecting their constituents.

"I feel the Phase I centers have been very badly treated by NSF, and I urge you to remedy this injustice," Rep. Martin Olav Sabo (D-Minn.), in whose district the University of Minnesota just happens to be located, told the House Subcommittee on Housing and Urban Development and Independent Agencies. "These centers were created through local initiatives with local funds. They provided needed support to NSF researchers when they had nowhere else to go. I urge you to include some funds for Phase I centers so that NSF researchers who want to work at these centers can continue to do so."

Sabo buttressed his position with letters from a mathematician and an astronomer. The former touted the Cray-2 at Minnesota as being the only machine with a large enough memory to handle "a large class of problems which cannot be done on the other machines in a reasonable amount of time." He then took NSF to task because "it has not just cut off one of a number of centers, it has removed the only state-of-the-art machine from the basic science community." The astronomer, clearly not an expert in Washington ways, wrote that "it is very ironic that the Astronomy Division at NSF has funded our project for the next two years . . . but another division [advanced scientific computing] is prevented from giving us the money to use the Cray-2."

Offering time on that machine is exactly why the University of Minnesota believes it should be resurrected as a Phase I center. When the NSF cut off its funding, the centers' users took their money for cycle time elsewhere. The university managed to retain some of its local users and industrial partners, but overall use of the Cray-2 dropped precipitously. None of the other NSF centers—or non-NSF centers, for that matter—offers its users a Cray-2.

### NSF's Budget

**Proposed budgets for the next five years, in billions of dollars (actual budget for 1987 is $1.62 billion).**

| FISCAL YEAR | |
|---|---|
| 1988 | 1.84 |
| 1989 | 2.16 |
| 1990 | 2.47 |
| 1991 | 2.83 |
| 1992 | 3.25 |

Source: National Science Foundation Authorization Act for FY '88.

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# News in Perspective

"Our [NSF] users had to leave because we couldn't support them any longer," admits Jim Infante, dean of the University of Minnesota's Institute of Technology. "But we will try to woo those users back if we get funded for FY '88. We recognize that it will require a fairly high level of inconvenience for most of them. Many people who want a Unix and [Cray's Unix-like] Unicos operating system are going to have to make a really serious decision about whether to come back. And it's going to be tempered by their wondering whether the same funding crisis is going to happen again next year.

"Why should we be funded again? Because we've got something to offer that doesn't duplicate what's available anywhere," claims Infante. "No one else has a Cray-2. And if NSF's policy is to offer state-of-the-art supercomputing to as many people as possible, it's certainly counterproductive to go to exclusively Phase II centers. I hope this $3.5 million triggers a serious rethinking of NSF's present policy."

The current NSF university supercomputer initiative is a far cry from what the agency had envisioned. The original plan for supercomputing approved by Congress in 1984 called for the creation of eight to 10 centers requiring annual funding of nearly $100 million.

### Fighting Over the Scraps

As FY '88 dawns, the reality isn't even close. There are five national centers with a budget of $51.7 million, give or take the $3.5 million which may or may not go to the Phase I centers. Their fate currently rests with the Senate Appropriations Committee, and then possibly with a conference committee. And forget eight to 10 centers. There are no more in sight.

The five current centers are also fighting among each other for the largest share of the money. Each center recently put its best foot forward before a program plan review panel of outside experts appointed by the NSF, which included members from the Lawrence Livermore and Los Alamos national laboratories, Goddard Space Flight Center, and the National Center for Earthquake Engineering Research. The panelists will make recommendations to NSF as to which center gets how much. NSF isn't bound by the panel's views, but the agency isn't about to ignore them either.

**"OUR USERS HAD TO LEAVE; WE COULDN'T SUPPORT THEM."**

"This is the only peer review in the history of the program," a supercomputer center director said after his presentation. "They've needed it for a long time. If the panel told me to shut down my center, I couldn't argue with them. That's how much respect they've got in the scientific community.

"But sometimes I think NSF is more concerned with money than science. They told me in July that I'd have to take a $500,000 cut in FY '87. I'm already $4 million short for basic services in FY '88. I could put an upgrade in this place that would blow your mind. I've got a deal in place with four major computer vendors. But with the kind of money they're giving us, they're crippling the pro-

gram. Fifty million is a joke. It needs to be doubled to $100 million annually."

So, if NSF practices what it preaches, we're talking about some serious money. The prevailing sentiment on Capitol Hill is very much in favor of substantially increasing NSF funding. The House Science Committee has already authorized a doubling of NSF's budget by FY '92 to $3.25 billion (see "NSF's Budget").

Meanwhile, Phase II center directors say they are tired of acting like fund-raisers instead of scientists.

"We spend an unbelievable amount of time fund-raising," San Diego's Karin says. "Is my time or Prof. Larry Smarr's time or [director of the Phase II Theory Center at Cornell University] Prof. Ken Wilson's time well spent fund-raising?"

### Phase II May Self-Destruct

"The $3.5 million for the Phase I centers isn't going to make or break us," Karin says. "But it's an indication of what NSF's thinking. I think they want to open the program up again and not even restrict supercomputer usage to Phase I centers. If they do that, the whole program's going to self-destruct. I hope the Senate kills it [the $3.5 million Phase I allocation]."

"We're talking downstream costs of multibillions if we're going to do this right," says Smarr of the University of Illinois. "But I don't even have enough to cover my cooperative agreement right now. And when that expires in April 1990, I'm dead.

"With all this talk about U.S. competitiveness, we could have a significant impact on it. We could be in the forefront," he says. "We're like a loaded gun. But they keep pulling out the bullets. We want to get on with saving the country, but the country's not backing us up. The country had better wake up." ■

## BENCHMARKS

### AT&T Wins GE Contract

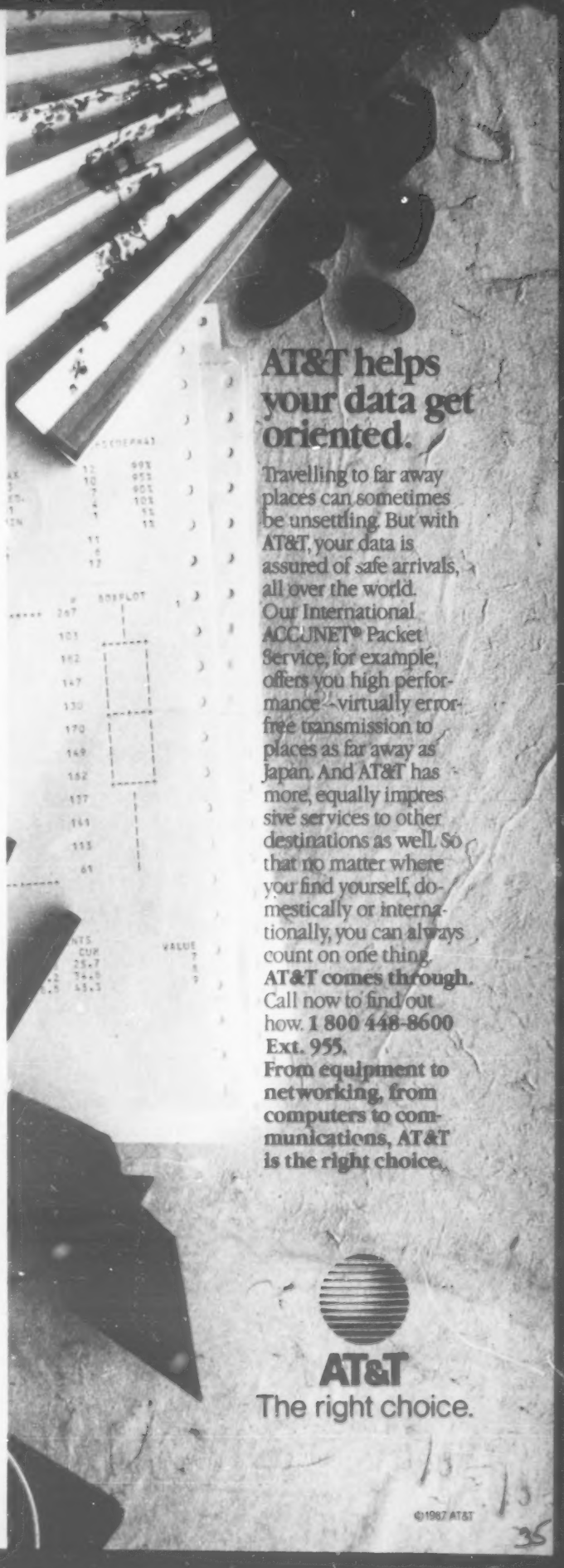
Following approval from the Federal Communications Commission and complaints from unhappy competitors, AT&T was awarded a $300 million, five-year telecommunications contract by General Electric Co. The plan calls for Fairfield, Conn.-based GE to replace old analog phone systems with a new digital network that integrates voice and data. The network will serve more than 700 locations. After a consortium consisting of U.S. Sprint, Network Equipment Technologies Inc., and Northern Telecom Ltd. lost out, complaints were filed that the AT&T bid violated FCC rules. The FCC didn't agree.

### Cray Architect Resigns

Steve S. Chen, senior vice president for systems design at Cray Research Inc. and architect of the Minneapolis company's best-selling supercomputer, the X-MP, has resigned following Cray's decision to cancel a next generation supercomputer development project he headed. Cray will take a $3 million to $4 million write-off for the three months ended Sept. 30 to cover the costs related to the shutdown.

### Datapoint Exec Resigns

Doris D. Bencsik, who briefly held the distinction of being one of the few women to head a Fortune 500 computer company, and who guided Datapoint Corp. through a major reorganization earlier this year, has resigned from the San Antonio company. Bencsik's resignation as chief operating officer followed close on the heels of the appointment of Robert Potter as chief executive officer. Potter was recruited from Northern Telecom Inc. in June to head the company, while Bencsik, who had been appointed acting ceo in January, was passed over for the position. ■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# Behind the News

STAFF REPORT

# How Competitive Is the U.S. IS Industry?

Though challenged, it still leads in most technologies. An exclusive poll reveals that computing pros want a strong U.S. industry maintained.

BY DAVID R. BROUSELL

Competitiveness. From Route 128 in the Northeast to the software factories of California, the word has become corporate America's new battle cry. In nearly every speech by a corporate chief executive, in nearly every announcement heralding a new product, this cry can be heard. Business has awakened from its torpor, first induced by the successes of the mid-1970s and later sustained by the recession of the early '80s, and has renewed its sense of self-worth after enduring a stinging series of industrial embarrassments, most notably in electronic components. Yankee pride has been piqued; the old juices are flowing again.

For U.S. industry, the word "competitiveness" does not mean merely more sales or market share. Having and keeping a technological as well as a marketing edge is the reward, not the motivation. This drive for competitiveness can perhaps be found in a deeper desire to preserve a uniquely American identity, as well as to turn back a perceived threat to the American standard of living.

That threat is reflected, at least partially, in the U.S. Commerce Department's U.S. Industrial Outlook report for 1987. It says, "In 1987, the [U.S.] computer equipment industry's historically ample trade balance could turn into a deficit, eroded by continued sluggish exports and strong import growth."

The Commerce Department reported that, in 1986, computer product exports from U.S. manufacturers, at about $13.26 billion, were down about 5% from the year before. Over the same period, imports of computer equipment into the country were up 26% to about $10.4 billion worth. Commerce predicts that, by the end of 1987, exports will have increased 5%, but computer imports will have grown another 30%. In 1986, the U.S. trade deficit with Japan grew to $3 billion from $2 billion in 1985.

The Commerce Department report

CONTENTS

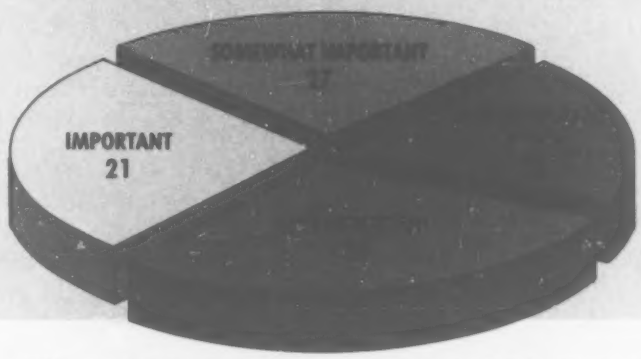

Japan....42
Washington....46
Mainframes....53
Midrange Systems....58
Communications....60
Microcomputers....62
Supercomputers....62


KEEPING AMERICA COMPETITIVE

Illustrations by Peggie Buchanan

## FIGURE 1 Is It Important to Buy American?

(BY PERCENTAGE OF DATAMATION READERS POLLED)




said the shifting trade balance, coupled with a continued trend for U.S. manufacturers to go to offshore production themselves, has cut into the U.S. computer industry's employee count. The number of employes in the industry dropped 9% in 1985 and fell another 7% last year.

In many ways, the U.S. information systems industry, that cutting edge of the nation's technological prowess, is leading the charge in the campaign for competitiveness. Everything from microelectronics to supercomputers to the trade deficit in high-technology goods to the number of computer science graduates projected to emerge from colleges and universities is under scrutiny by the government, industry, and the public at large. Clearly, computer and electronics technology together are regarded as the key to remaining competitive for all American industries.

Coincident with this technological call to arms are fundamental shifts in the economic terrain. Corporate consolidation has swept through U.S. industry, and the computer arena is no exception. The creation of Unisys from Burroughs and Sperry, the triumvirate Honeywell Bull, the formation of the Microelectronics and Computer Technology Corp. and the proposed Sematech, the wave of mergers in the software industry—all reflect the need for greater efficiencies and market staying power. Big is now considered good—and necessary.

An exclusive DATAMATION poll of its readers, the users of information processing technology and equipment, presents perceptions of the state of U.S. computer industry competitiveness. A large majority of those surveyed believe that, overall, the U.S. is still a leader in all key product areas, from microelectronics to supercomputers and software and services. But they also believe the U.S. is facing serious competitive threats—most notably from Japan—in many product areas, and that the U.S. must maintain a strong industry. The concern represents a bread and butter issue: 87% of those polled say that high-technology goods and services have made their companies more competitive.

### A Close Look at Competitiveness

This poll is only one part of a comprehensive DATAMATION review of U.S. computer industry competitiveness. The review itself is part of a continuing effort by the Electronics & Computer Group of Cahners Publishing Co., of which DATAMATION is a part, to report on American industrial competitiveness. In this, the first installment of a DATAMATION series that will appear from time to time, sections focus on such product areas as mainframes, minicomputers, microcomputers, supercomputers, and communications, and include views from both Japan and Washington, D.C.

A powerful sentiment culled from the poll is that IS professionals in the U.S. believe deeply in the necessity of a strong U.S. computer industry, the notion of a global economy notwithstanding. Of those surveyed, 98% say it is important for the U.S. to have a strong, indigenous computer industry. Only 1% indicate that it is unimportant because the U.S. is part of a global economy. At the same time, in what may reflect a sensitivity to price and quality, as well as such factors as compatibility, ease of use, and performance, 60% indicate an overriding commitment to buying American-made computer equipment, software, and services—39% say it is "very important," 21% call it "important," 27% say "somewhat important," and 13% answer it is "not important at all" (see Figure 1).

The spirit of nationalism is alive and well, as is a commitment to free market forces, despite the often touted Japanese model of cooperation between government and industry. The reason most often cited by poll respondents concerning the need for a strong U.S. computer industry was economic prosperity and maintenance of the general welfare; keeping up with other countries, and national security were each cited less than half as often as was prosperity. Mentioned even less often was the specific need to keep Americans employed. One consistent theme running through these readers' explanations, however, was the crucial role information technology is

## FIGURE 2 Areas of Vulnerability

(PERCENTAGE OF DATAMATION READERS WHO PERCEIVE A THREAT TO THE U.S. COMPUTER INDUSTRY IN THE FOLLOWING AREAS)

| | |
|---|---|
| Microelectronics | 64 |
| Mainframes | 43 |
| Microcomputers | 53 |
| Minicomputers | 31 |
| Supercomputers | 40 |
| Data Communications | 36 |
| Applications Software | 24 |
| Systems Software | 17 |
| Computer Services | 13 |

Charts by Sharon Bystrek

## FIGURE 3 Rating the Competition by Country

PERCENTAGE OF DATAMATION READERS WHO PERCEIVE A COMPETITIVE THREAT TO THE U.S. COMPUTER INDUSTRY IN THE FOLLOWING AREAS BY THESE FOREIGN INDUSTRIES

| | JAPAN | SOUTH KOREA | TAIWAN | EUROPE | WEST GERMANY | ISRAEL |
|---|---|---|---|---|---|---|
| Microelectronics | 94 | 12 | 4 | | | |
| Mainframes | 100 | 3 | | 3 | | |
| Microcomputers | 90 | 4 | 4 | 4 | | |
| Minicomputers | 54 | 3 | 3 | 8 | | |
| Supercomputers | 63 | | | | | |
| Data Communications | 100 | | | 7 | 11 | |
| Applications Software | 50 | 39 | | | | 12 |
| Systems Software | 78 | | 15 | | | |
| Computer Services | 60 | | 36 | | | |

perceived to play in keeping the nation, and their companies, first rate.

The fundamental model on which the U.S. should base its competitive strategy, the poll showed, is the free market. In a similar vein, U.S. computing professionals firmly believe that large corporations are necessary for successful international competition.

On the question of whether the U.S. should have a national high-technology industrial policy formulated and implemented in concert by government and industry, 77% say no, that the industry should be controlled by free market forces. Only 20% are in favor of such cooperation; 3% had no answer. Meanwhile, 64% of those polled say that the U.S. should relax and/or modify antitrust laws to encourage the formation of high-tech corporate combinations to promote competitiveness. Thirty-three percent say the laws should not be changed; 3% had no answer.

In regard to specific product categories, 81% of those polled say that they believe the U.S. is still a leader in microelectronics despite the apparent dominance Japan has achieved in the markets for some electronic parts. Ninety-six percent say the U.S. is a leader in mainframes, but only 76% feel this is true of the U.S. position in the microcomputer market. Ninety-five percent perceived U.S. leadership in minicomputers; 88% in supercomputers; 85% in data communications equipment; 92% in applications software; 95% in systems software; and 88% in computer services.

The poll asked about specific product areas in which respondents perceived a potential threat from foreign competitors and from which countries in particular. The respondents indicate that, overall, the competitive threat to the U.S. is to be found in the hardware market. Software and services, on the other hand, scored highest in competitive strength.

### Japan Threatens; Micros Threatened

Of all the categories, the area seen as most vulnerable is microelectronics; 64% believe the U.S. is threatened in components. Japan is picked as the chief antagonist by 94% of those who believe the U.S. faces a competitive threat in this area; South Korea is mentioned by 12%; and Taiwan is mentioned by 4%. In the mainframe market, 43% of those polled believe there is a threat to U.S. leadership, with 100% of those respondents mentioning Japan. South Korea and Europe were each mentioned by 3% of those polled as posing a threat (see Figures 2 and 3).

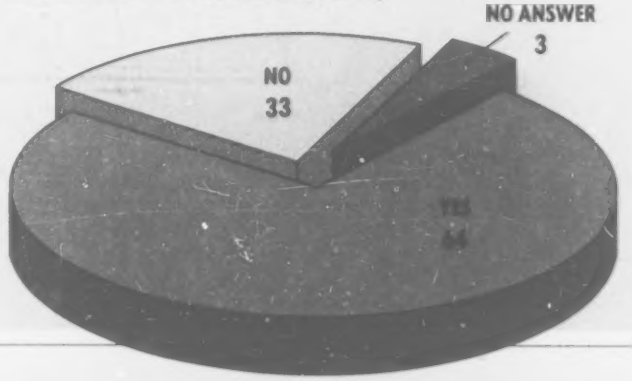
In regard to microcomputers, 53% believe that the U.S. faces a competitive threat, with 90% of them mentioning Japan and 4% each mentioning South Korea, Taiwan, and Europe. Only 31% say they see a challenge in the minicomputer arena, with 54% of them believing it comes from Japan, 3% each naming South Korea and Taiwan, and 8% picking Europe. Forty percent of DATAMATION readers polled see a threat in the supercomputer market, with Japan the one and only force to be reckoned with. Thirty-six percent see a threat to datacom, with 100% picking Japan, 7% naming Europe, and 11% citing West Germany.

Applications and systems software are seen by only 24% and 17%, respectively, as being threatened. In applications, 50% mention Japan as a competitor, 39% say South Korea, and 12% name Israel. In systems software, Japan is mentioned by 78% and Europe by 15%. Computer services came up strongest, with only 13% seeing a threat. Sixty percent of those respondents see a threat from Japan and 36% from Europe.

Even though the overwhelming majority of those polled indicate that computer equipment and services have made their companies more competitive, about 10% fewer, or 77%, say the technology is being used to its fullest potential in their companies. Seventeen percent say the equipment is not being used to the greatest possible extent; 6% had no answer. One reason often cited for this shortfall is poor management. Of those claiming success in using high-tech products to enhance competitiveness, the reason cited most often is that their enterprises are information processors and therefore these goods and services are integral to their businesses. The availability of information, and timely access to it, are also mentioned. ■

## FIGURE 4 Should the U.S. Relax Antitrust Law?

(BY PERCENTAGE OF DATAMATION READERS POLLED)



"Lots of Japanese testing and process control equipment is being sold in the U.S.," including that of such companies as Anritsu, Advantest, and Hitachi. In Stern's opinion, "The idea is new—to go after the computer market not through the strength of the computer but on the strength of the equipment you can hook up to it." He warns, "Too many U.S. companies have dismissed TRON."

**Unix Workstations a Target?**

More mundane is the possibility that TRON may serve as the basis for a Unix workstation export offensive. Hitachi and Fujitsu are writing a version of Unix to run on the powerful 32-bit TRON mpus they are developing, with the intention of exporting Unix machines to the U.S. while domestic products are built that run the full TRON OS.

Even if Japanese manufacturers were successful in capturing large shares of the U.S. computing market, the question would remain whether or not that would be harmful to the end user. Proponents of such ideas as the "borderless economy" espoused by NEC president Tadahiro Sekimoto naturally feel not. Sophia University's Gregory, for example, feels that "the computer industry isn't a national industry, it's a global industry, so we'll see a global rationalization and division of labor. I don't think we should worry about it."

On the other hand, if U.S. users become dependent on Japanese-made hardware, whether it be supercomputers, workstations, or factory control systems, they may be vulnerable to the same problem some semiconductor purchasers are now facing: the most advanced new products go to their Japanese competitors. This may pose more of a problem for small users than for larger ones. Explains Stern, "A [Japanese] domestic client ordering large quantities will always get priority over overseas companies ordering a smaller quantity. This is a danger whenever U.S. manufacturers are overly dependent on foreign suppliers."

Many Japanese computer companies are themselves manufacturers of heavily IS-dependent industrial machinery, which would naturally have first call on new computer technology. Given such possibilities, it becomes clear that the fate of much more than computer manufacturing is at stake in the Japanese challenge to the U.S. computing industry. ■

# Washington:
## The Official Story

BY WILLIE SCHATZ

"Competitiveness" has achieved the same exalted status as the weather. Everybody talks about it, but no one seems able to do anything about it.

"I told my staff I didn't want to hear the word anymore," says Sen. Bill Bradley (D-N.J.), the main man behind the Tax Reform Act of 1986. "So now they call it 'the C word.' It's used so often that it's nothing more than mush. That makes it the politician's dream."

And everyone else's. You want something from someone in Washington, D.C.? Just say the C word.

The National Science Foundation (NSF) requested a 17% budget increase for fiscal year 1988 and a doubling of its budget by 1992 in what it admitted is "a period of serious fiscal constraints." Why does NSF deserve these precious bucks? "The answer, in a word, is competitiveness," the agency said in its budget request. Rep. Richard Gephardt (D-Mo.) wanted to force countries that gained "excessive" trade surpluses through unfair trade practices—of which everyone has a different definition—to reduce their surpluses by 10% annually or confront U.S. retaliation. It was an incredibly controversial piece of the House comprehensive trade bill, but citing competitiveness helped the measure pass by four votes.

Has calling the subject "competitiveness" made any difference for the computer industry? As always, there's good news and bad news. Competitiveness, like beauty, is in the eye of the beholder.

The good news is that, according to the Computer and Business Equipment Manufacturers Association (CBEMA), the information systems industry finished the first half of the year (the last period for which statistics are available) with a $2.2 billion surplus in computers. Not many other industries were in the black at the end of June.

There was much more bad news. The surplus decreased by 32.5% compared with the $3.3 billion chalked up in the first half of last year. Imports for the half rose 63%, while exports increased 19.6%. The business equipment and telecommunications sectors were $1.1 billion in the red and telecommunications was $1 billion in the red. The computer industry's positive cash flow allowed the three combined sectors, including forms and supplies, to finish with a postitive trade balance of $269.6 million, but that was 81.1% less than the comparable half in 1986. Forms and supplies accounted for a $221.8 million trade surplus in the first half of this year.

**A Definition of Competitiveness**

There's a theory making the rounds in Washington, however, suggesting that the trade deficit is neither the only nor the most accurate measure of competitiveness.

"There are three phases to competitiveness," Sen. Bradley says. "In the short term, we're talking about the trade deficit. For the middle term, we need to concentrate on pooling our resources for research and development. But the thing that's really going to affect our ability to regain what we've lost is a long-term attitudinal change. We've got to start thinking globally, not just nationally. And to do that we've got to change the educational system."

No piece of that triumvirate is anything to write home about. While the trade deficit has been around awhile, it has never looked this grim. In 1986, the U.S. imported $170 billion more in goods than it exported. And for the first time, the U.S. imported more high-tech products than it exported.

Why? Take your pick: decreased productivity of U.S. workers; stringent export controls that make it at best difficult and at worst impossible for U.S. firms to compete abroad; a rather large budget deficit, which skews the entire international monetary scales; unfair trade practices.

"We still act as though we have to

worry about internal competition," Carnegie-Mellon University president Richard Cyert told the American Society of Mechanical Engineers' (ASME) recent conference on supercomputers. "The real problem is to make ourselves capable of competing in the international marketplace.

"How do we do that?" he asks. "By realizing our economy is on the frontier and we have to work as hard on it as we did in settling this country. And by changing our way of thinking."

And how are we going to do that? By altering our educational system. It seems that the competitiveness fault lies not in the factories or shipyards or the backyard garages where they're creating the next Apple, but in the classroom.

"Basic research is the underpinning of everything," says Erich Bloch, director of NSF. "It's no longer natural resources that determine how competitive a country is. It's intellectual resources. The transfer to the private sector of new knowledge gained through basic research is the foundation of economic competitiveness."

That's a given, right? After all, this is the Information Age. But you'd have a hard time determining that from the bottom line. When money talks, basic research walks.

Bloch says that Japan spends a higher percentage of its total R&D budget on basic research than the U.S. Japan also turns out twice as many engineers per capita as the U.S. Last year, more foreign students than American students earned their doctorates in engineering from American universities. Most of those foreign graduates went back home to contribute to industry.

So U.S. students aren't exactly having pleasant dreams about becoming a scientist or engineer. They'd rather make a quick five or 10 million bucks on Wall Street.

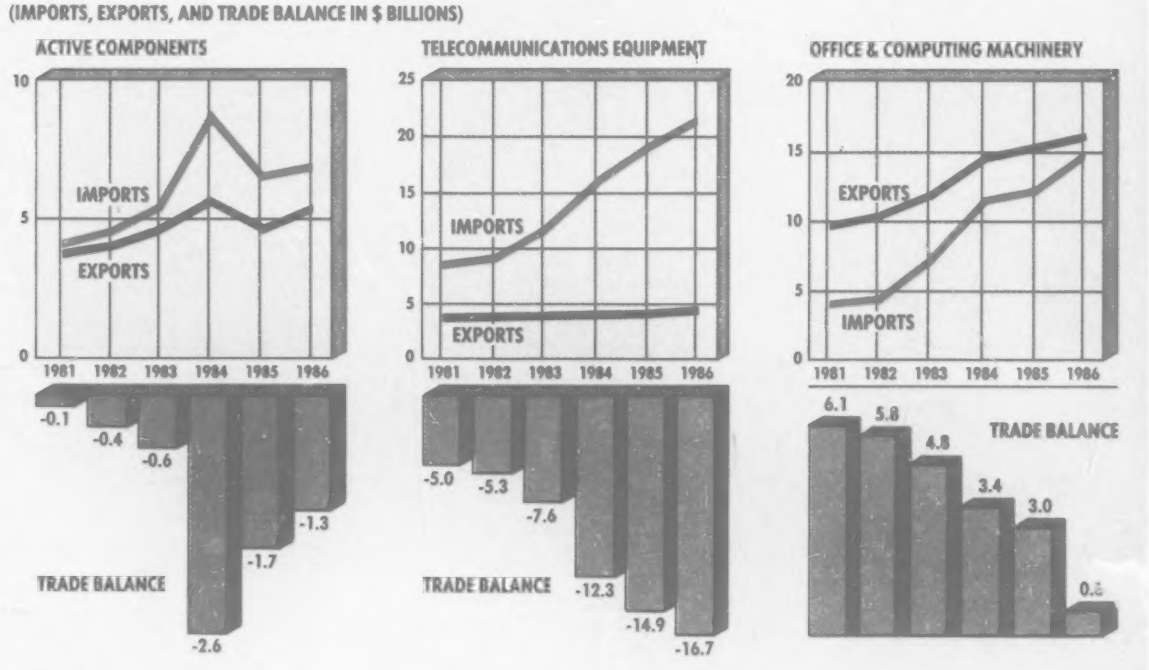
"The incentive to go into science and engineering research is not as great here as it is in other countries," says Ed Zschau, a partner in Brentwood Associates, a Mountain View, Calif., venture capital firm. The former computer executive and head of the House Republican Task Force on High Technology is now chairman of the American Electronics Association's Council on Competitiveness.

If the federal budget is any indication of where the government's head is at, someone else is going to have to do the job. According to ASME, industrial R&D and federal R&D will each total $60 billion this year. That's an all-time high for industry, but its annual R&D growth has fallen considerably behind the government's. Annual growth for industrial R&D for 1985-1987 is estimated at 2%, compared with about 6% annual increases in 1975-1985.

Total federal R&D support grew about 12% in 1986 and will increase almost 16% this year. Federal civilian R&D, however, was practically flat in real dollars between 1979 and 1984, while military R&D shot the moon. It's now about 72% of federal R&D, compared with 48% in 1979.

"We must turn ourselves around," said Paul Gray, president of the Massa-

**FIGURE 5 From Components to Computers, Imports Grow Faster Than Exports**




Source: Dept. of Commerce

**STAFF REPORT**

chusetts Institute of Technology, at the 1987 IEEE Technology Policy Conference. "We must teach engineering students and the employers of engineers to value people who worry about how things are made and about how *well* things are made. Beyond that, for our own part, we must learn how to teach manufacturing skills in ways that capture the imaginations of our best students, and we must recast the frontiers of manufacturing research in ways that will attract our best engineering faculty."

What's the first step in this long march? Would you believe the Computer Education Assistance Act of 1987?

According to one of its sponsors, Sen. Tim Wirth (D-Colo.), the bill would target funds to low-income and rural school districts that haven't had the dollars to buy the hardware and software their students need. Wirth says they need that equipment to "ensure that the next generation of graduates is adequately prepared to meet the challenges of tomorrow's technologically advanced workplace." That, of course, will ensure "improving America's competitiveness at home and abroad."

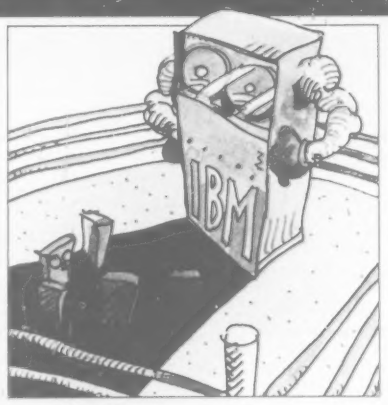
The bill has the support of a broad spectrum of the computer industry, including CBEMA and ADAPSO. But who could be against this legislation? No one. Let the record reflect that we're talking elementary and junior high school students here. That's as close to apple pie and motherhood as you can get without the real things. It's also as good an indication as any of how deeply "competitiveness" has permeated U.S. society.

"We have it within our power to restore the trade deficit and go toe to toe with other countries," Zschau continues. "But the responsibility for competitiveness lies with the companies, not the government. It's always best if you can blame somebody else, though. Politicians don't want to tell constituents they can help themselves."

And if they don't?

"Should this nation fail to meet the challenge of slow growth in productivity," Gray said to his IEEE audience, "there is significant danger that America will lose its economic—and eventually its political—leadership in the world. Sadly, there are few present indications that this nation either understands the threat or has begun to take the steps required to reverse the trend."

There's still time, but the zero hour may not be too many ticks away. ■




# Mainframes:
## Still a Big Blue Game

BY JEFF MOAD

The U.S. Commerce Department's report on the industrial outlook for 1987 reveals quite clearly the negative trend of increasing computer equipment imports. Most U.S. market share losses, however, seem to be coming in the microcomputer and smaller peripherals product areas. U.S. vendors of large-scale commercial computers, storage, and software appear to be holding their own against competitive pressure that is coming, primarily, from Japan. While commercial mainframe computer and large-scale storage vendors Hitachi and Fujitsu have made some small market share gains versus U.S. suppliers, American companies, led by IBM, still retain their leadership roles in key software and architecture design areas.

According to Donald Powers, research and development vice president at Control Data Corp., the Japanese "have been strong in hardware areas such as developing semiconductors and packaging them so that they get all the performance possible out of the silicon." But when it comes to software innovations or new hardware architectures, Japanese vendors "aren't as competitive as they are in building hardware."

In recent years, on the strength of advanced semiconductor and packaging technologies, Japanese vendors have succeeded in making sporadic market share headway. With a commercial mainframe uniprocessor that is significantly faster than IBM's and with more main memory, Hitachi was able to double it's share of the IBM-compatible mainframe market in 1986 to 4% through its San Jose-based National Advanced Systems and Comparex European marketing partners, according to the 1987 Computer and Telecommunications Survey conducted by DATAMATION and Cowen & Co., Boston. Amdahl Corp., Sunnyvale, Calif., which sells IBM-compatible mainframes based on Fujitsu subsystems, also was able to make significant market share gains this year.

Those pcm vendors, however, never have been able to increase their combined share of the huge IBM-compatible mainframe market above 15%, according to the survey, nor have their Japanese partners been able to gain much mainframe market share on their own outside of Japan. The reason continues to be that U.S. vendors control most of the key operating system and applications software. Most users are reluctant to stray too far from the hardware vendors that can promise continued support of the existing software in which most of them have invested heavily.

### The Effect of Software Dependence

That leaves the Japanese and other non-U.S. vendors of commercial mainframe hardware little choice but to remain compatible with IBM software. As a result, many overseas mainframe competitors, in the interest of maintaining IBM compatibility, cannot make use of some advanced technology—such as denser memories, dedicated database management hardware, or faster channels—until IBM does.

According to Unisys program management vice president Fred Meier, "The problem for the Japanese mainframe vendors is that currently the world won't consider another new mainframe operating system." Many European vendors and, to a lesser extent, the Japanese, have sought in Unix an open operating system alternative and a solution to their strategic software problems. Unix, however, still lacks many of the security and record-locking features found in mature mainframe operating systems such as IBM's MVS/XA. Although there have been efforts to upgrade Unix and develop a Unix standard, Meier points out that "there is no unified approach."

Observers note that U.S. vendors and researchers also continue to lead in other key mainframe software areas such as database management systems, hierarchical storage management, and performance measurement. In spite of Japanese government-sponsored re-

Circle #26 on Reader Service Card

**Are you underpaid? Does the vice president of MIS at the company around the corner make more than you? How much should you ask for in your next raise? DATAMATION's annual salary survey reveals that increases in 1986 were up an average of 5.8%, a handsome margin above the inflation rate. Next year might not be as kind, though. Better news: turnover is down.**

# What Are You Worth?

BY PARKER HODGES

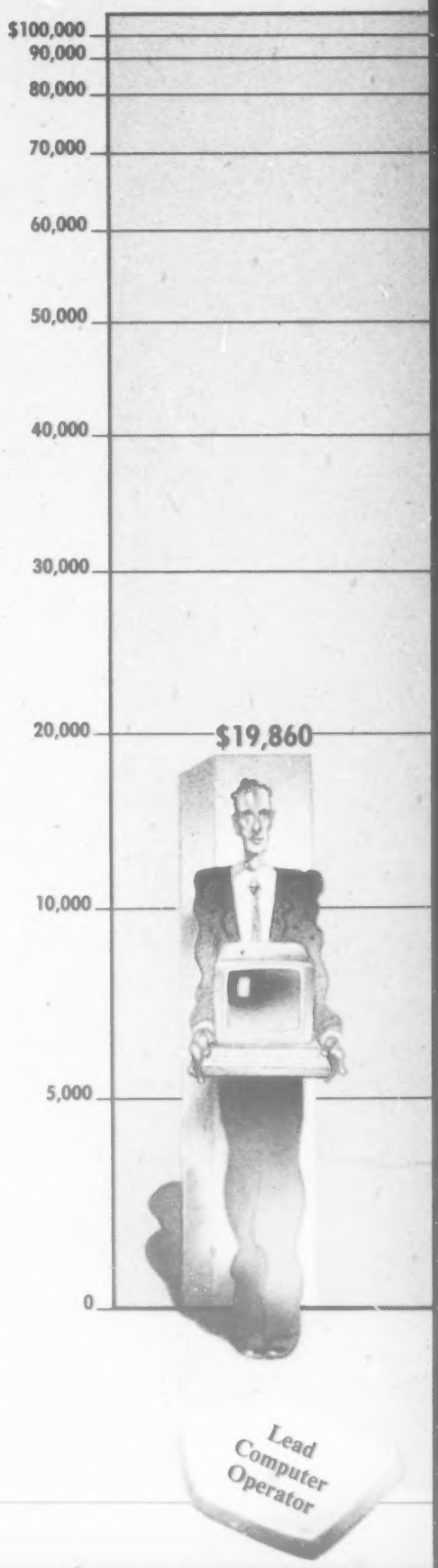
"The last two people I lost left to get more money," says William Foulds, director of information systems for St. Anthony's Ancillary Services at St. Anthony's Hospital in St. Petersburg, Fla. Foulds, like virtually every other manager in the MIS business, must deal with a feeling apparently universal among the salaried: "I'm underpaid."

To see where you stack up on the pay scale, take a look at the two large tables on pages 84 and 86. But even if you don't beat the average for your job or your geographical area, don't feel too bad. According to the Bureau of Labor Statistics, the average yearly wage for U.S. workers in the private, nonagricultural sector was $16,253 in June 1987. Only three jobs out of the 47 surveyed came in lower than this: magnetic media librarian, data entry operator, and word processing operator.

This year's DATAMATION Salary Survey found a better paid population expecting to be even better paid by this time next year. Fully 42 of the 47 job categories report higher salaries than in last year's survey. Just over half the positions in the survey reported salaries at least 5% higher than a year ago. The jobs reporting the highest increases over last year were directors of security, pc evaluators, microcomputer user services specialists, consultants, and junior systems programmers: the average salaries for our sample in these positions were more than 20% higher than the salaries reported in last year's survey.

Two of the three losing job categories were in word processing shops: salaries for wp supervisors and wp operators were reported off 3.8% and 2.5%, respectively. The other losing job was intermediate applications programmer, reporting an average salary 8.9% lower than last year's sample. Two jobs were reported paying exactly the same as last year: junior applications programmers and lead systems analyst/programmers.

Overall, the DATAMATION sample reported that, during 1986, raises throughout the industry had averaged 5.8%, just shy of the 6% that participants in last year's survey had expected. Since inflation hit a longtime low—1.7%—in the year ending June 1986, when the last survey was conducted, those raises represented a handsome 4.1% increase in purchasing power for MIS professionals. This year will apparently see a smaller increase in spendable cash. Respondents to the survey expect increases this year to average 5.9%, just 2.1% over the 3.8% inflation rate in the year since June of 1986. While the government predicts infla-



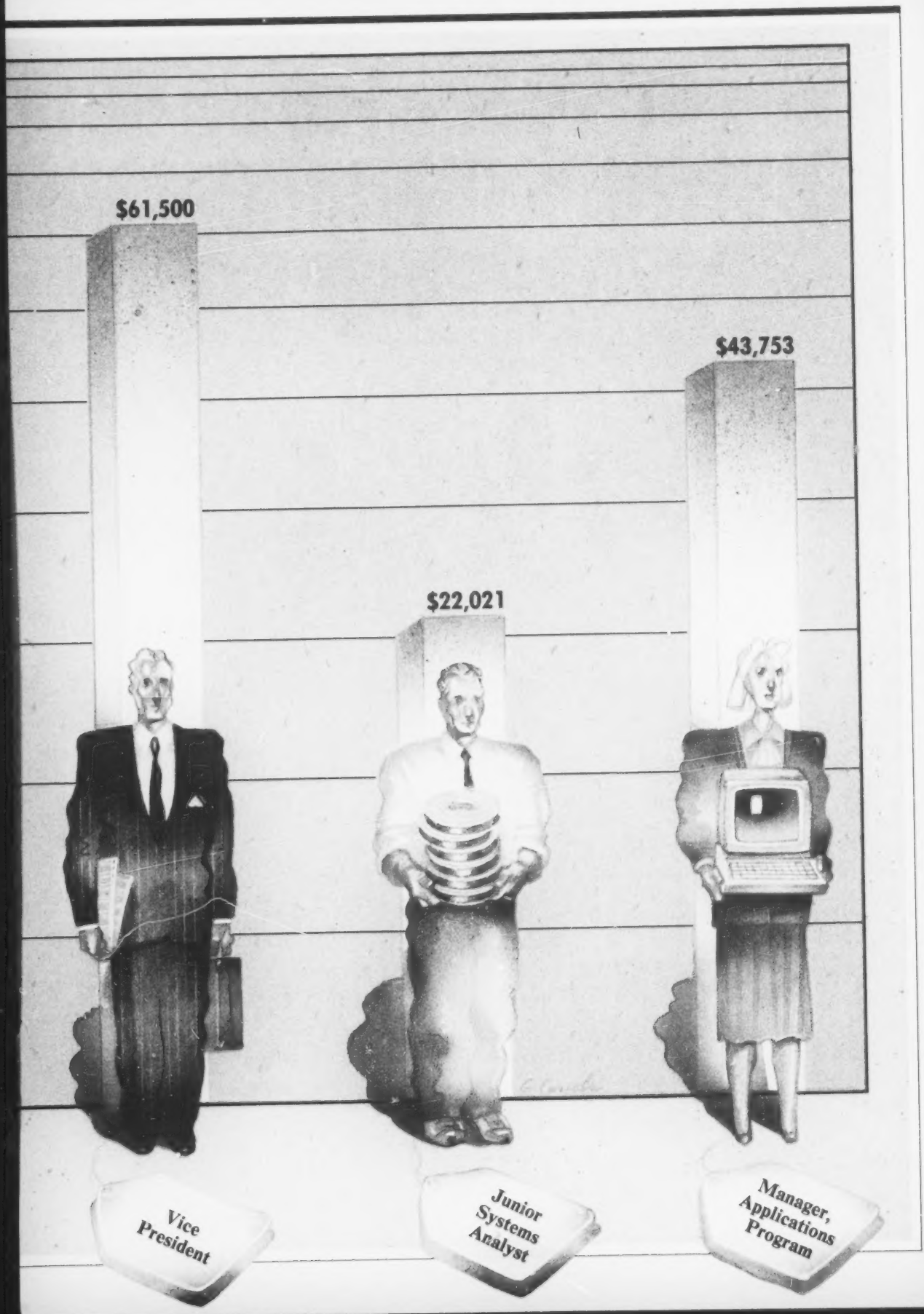
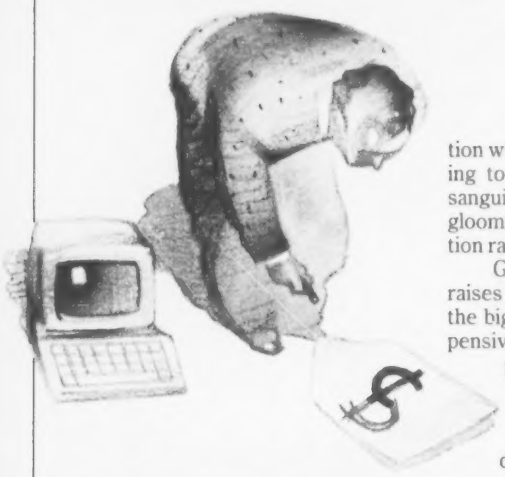



Illustration by Greg Couch



tion will ebb a bit in the coming year, falling to 3.2%, a minority group of less sanguine economists have painted a gloomier picture, seeing an annual inflation rate approaching 7% by early 1988.

Geographic differences in 1986 raises were perhaps predictable, with the biggest increases to be found in expensive places: New York and its metropolitan area and Los Angeles reported average raises of more than 7% (see Figure 1). The lowest average increases—under 5%—were found in Seattle, St. Louis, and Cleveland. The remainder of the country reported average raises between 5.1%—in Chicago—and 6.4%—in Washington, D.C.

Compared with other U.S. workers, these increases look healthy indeed. According to the Labor Department, in private industry, union-represented workers who signed contracts during the first six months of 1987 received pay increases of only 2.5%. Union-represented employees of state and local governments did better, averaging 5.4%. Primary and secondary schoolteachers did best, their raises under contracts signed this year averaging 6.9%. Except for the teachers, who had gotten 6.3% raises in contracts negotiated last year, this year's raises aren't what American workers have grown to expect. In June 1987, white-collar workers were averaging 3.3% more salary than they'd made a year earlier; but in June of 1986, white-collar workers had averaged 4.5% higher than in 1985. The same trend held true for professional and technical workers: 1987 wages were 3.8% over 1986; in 1986, the increase had been 4.1%.

Some studies of information systems workers seem to indicate that DATAMATION's readers are doing better than their colleagues as a whole: according to Jeff Long, a spokesman for the Administrative Management Society in Willow Grove, Pa., IS workers' raises in 1986 averaged only 3.5%, down from 1985's 5.3%.

Another area in which DATAMATION's sample seems to be doing better than many in the industry is in the expensive matter of staff turnover. Last year, the survey found that managers had expected they'd have to replace 7.1% of their employees during 1986. According to this year's survey, the actual turnover rate for 1986 was 8.8%. For 1987, these managers expect a turnover rate just a bit higher, 9.1%. The expectation of higher turnover rates confirms findings in other surveys, particularly those that show rising consumer confidence.

Roger O'Connor, a spokesman for Edward Perlin Associates, a New York firm specializing in compensation management, told DATAMATION that its studies of "the 40 or 50 largest companies" in various markets show higher turnover, rates especially in New York and Boston, where business is good and jobs are easy to come by. "In large companies in New York," says O'Connor, "turnover rate in systems is running 21%. In operations it is 14%." O'Connor says turnover rates are lower in areas where employees feel

## Detailed Job Descriptions

Respondents to the survey used this job description guide.

*Corporate staff:* reports to senior management within corporation.

*Applications programming:* develops, designs, and prepares computer programs.

*Systems analysis/programming:* systems analysis and applications programming.

*Operations systems programming:* programs and maintains systems software.

*Database administration:* plans, organizes, and schedules the activities of the database section; establishes standards, maintains dictionary.

*Datacom/telecom:* develops and designs data communications networks and the installation and operation of data lines.

*Computer operations:* in charge of equipment, data entry, production control, and postprocessing, but not systems analysis, or other development functions.

*Production and I/O control:* sets up and schedules jobs for processing so as to maximize utilization and meet turnaround requirements.

*Data entry:* performs data entry and verification functions.

*Office automation:* operation of word processing equipment, intelligent typewriters, and terminals for text editing/word processing.

**Job Levels**

*Manager:* advanced degree and minimum five years' experience or equivalent combinations; strong management skills, performs personnel evaluations, budgeting, progress reporting, and project management.

*Lead:* bachelor's degree or equivalent and minimum four years' experience with two years in supervisory capacity; performs supervision as a project manager.

*Senior:* bachelor's degree or equivalent and minimum three years' experience, including some supervisory functions.

*Intermediate:* bachelor's degree or equivalent and minimum two years' experience; requires direction on some activities.

*Junior:* two to four years' college and six months' experience; directly supervised.

## Methodology

The 1987 DATAMATION Salary Survey began in June with a questionnaire sent to 10,000 IS officials in the United States, drawn at random from the magazine's list of 64,000 top managers at computer sites throughout the country.

A total of 596 key officials returned completed questionnaires, providing information on salaries, benefits, and perquisites for 47 discrete IS positions in various industries and metropolitan areas. Half of the respondents are from Fortune 1000 companies; the other half were chosen at random and could represent companies of any size, from the smallest to the largest.

As shown in the accompanying tables, the most important labor pools covered by the survey were those in Boston, New York (divided into Manhattan and its environs), Philadelphia, Washington, D.C./Baltimore, Atlanta, Denver, Houston, Dallas/Fort Worth, Chicago, Minneapolis/St. Paul, Cleveland, Cincinnati/Columbus, Detroit, St. Louis, Seattle, San Francisco/Silicon Valley, and Los Angeles. The salary and other data were also broken down by industry category.

"more anxiety" about job availability, citing San Francisco in particular.

Of course, some companies' employees choose to stick around because they like their jobs. David Dahlke, director of data processing for Harris Farms in Coalinga, Calif., told DATAMATION that his company's longtime zero turnover rate is due to several factors, among them good pay. "We try to pay Bay Area/Los Angeles salaries in an area where the cost of living is about half." But Dahlke stresses that "the challenge of the job" can be as important as pay. The agricultural marketplace is "an unusual one" says Dahlke. "Not much has been done to develop systems in this area." In addition to intriguing problems, Dahlke's staff has also been given interesting resources with which to solve them. "We've got a lot of nice stuff to work with," says Dahlke, noting that Harris has served as a beta site for software houses and that it had the first local installation of a VAX cluster. Dahlke also adds that Harris has been "generous with training."

Equipment changes can also affect turnover rates. Dennis Foreman, data processing manager at Nico Construction Co., New York, had a zero turnover rate in 1986. This year, he's got problems: with his staff growing by a third, he'll also face a 20% turnover rate. Staffing is one reason Foreman's shop is

changing vendors, moving to IBM from an old Sperry system. "It is easier to get staff for IBM systems," he says.

Ashby Lincoln is vice president of dp at Conseco Inc., an insurance holding company that owns Bankers National Life Insurance Co., Lincoln American Life Insurance Co., Lincoln Income Life Insurance Co., and Western National Life. Last year, he dealt with a 20% turnover rate. This year, he expects turnover to plunge to 5%. The reason? "We moved from New Jersey to Carmel, Ind., a northern suburb of Indianapolis." Lincoln says his new location makes hiring staff much easier than it had been in New Jersey. "In Indianapolis, we can hire from all over the Midwest." In New Jersey, says Lincoln, high housing costs in the New York metropolitan area discourage people from moving there. He adds that in New Jersey, "there are too many

## FIGURE 1 Annual Salary Increases

(IN PERCENT)

| | EXPECTED IN 1986 | ACTUAL 1986 | EXPECT IN 1987 |
|---|---|---|---|
| Boston | 6.0 | 5.6 | 5.6 |
| Manhattan | 8.3 | 7.2 | 11.3 |
| NYC Metro | 6.8 | 7.3 | 7.6 |
| Philadelphia | 5.9 | 5.6 | 5.5 |
| Wash./Balt. | 8.5 | 6.4 | 6.6 |
| Atlanta | 6.0 | 5.5 | 6.3 |
| Denver | 5.2 | 6.8 | 6.3 |
| Houston | 4.5 | 5.4 | 4.6 |
| Dallas/Ft. Worth | 5.6 | 5.5 | 5.5 |
| Chicago | 5.6 | 5.1 | 5.6 |
| Minn./St. Paul | 5.5 | 5.4 | 5.2 |
| Cleveland | 5.4 | 4.4 | 5.0 |
| Cin./Columbus | 6.6 | 5.5 | 5.3 |
| Detroit | 6.6 | 5.9 | 6.1 |
| St. Louis | 5.2 | 4.5 | 4.7 |
| Seattle | 6.6 | 3.9 | 3.3 |
| San Francisco | 7.2 | 6.3 | 6.4 |
| Los Angeles | 5.9 | 7.2 | 6.3 |
| Total Sample | 6.0 | 5.8 | 5.9 |

## FIGURE 2 Turnover Rates

(IN PERCENT)

| | EXPECTED IN 1986 | ACTUAL 1986 | EXPECT IN 1987 |
|---|---|---|---|
| Boston | 7.4 | 7.3 | 10.5 |
| Manhattan | 6.8 | 2.8 | 2.3 |
| NYC Metro | 6.1 | 15.6 | 10.7 |
| Philadelphia | 4.6 | 11.4 | 14.9 |
| Wash./Balt. | 13.7 | 6.2 | 8.2 |
| Atlanta | 4.9 | 14.3 | 6.8 |
| Denver | 11.4 | 4.0 | 5.1 |
| Houston | 2.5 | 8.3 | 5.8 |
| Dallas/Ft. Worth | 4.9 | 10.4 | 7.5 |
| Chicago | 6.6 | 8.0 | 6.0 |
| Minn./St. Paul | 4.2 | 7.1 | 4.2 |
| Cleveland | 2.3 | 14.7 | 2.9 |
| Cin./Columbus | 1.9 | 5.6 | 7.8 |
| Detroit | 6.4 | 3.6 | 4.9 |
| St. Louis | 12.8 | 3.2 | 6.5 |
| Seattle | 6.7 | 1.3 | 2.5 |
| San Francisco | 6.1 | 9.3 | 5.0 |
| Los Angeles | 7.5 | 11.1 | 13.9 |
| Total Sample | 7.1 | 8.8 | 9.1 |

## FIGURE 3 Average Salary by Region (in $)

| | ALL | BOSTON | MANHAT | NYC AREA | PHILA | WASH/ BALT | ATLANTA |
|---|---|---|---|---|---|---|---|
| **CORPORATE STAFF** | | | | | | | |
| ■ Vice President | 61,505 | 75,000 | 99,999 | 66,938 | 65,000 | 51,875 | 54,260 |
| ■ Director of Dp/MIS | 49,754 | 57,019 | 63,667 | 57,471 | 51,032 | 54,277 | 46,310 |
| ■ Technical Services Manager | 47,450 | 47,500 | 90,000 | 48,111 | 43,307 | 48,591 | 50,200 |
| ■ Information Center/Data Center Manager | 41,029 | 50,667 | NA | 43,917 | 35,000 | 44,060 | 45,967 |
| ■ Director of Security | 45,026 | NA | NA | NA | NA | 46,250 | 39,300 |
| **SYSTEMS ANALYSIS** | | | | | | | |
| ■ Manager | 44,505 | 52,000 | 40,000 | 51,000 | 42,733 | 46,667 | 36,333 |
| ■ Senior Systems Analyst | 38,852 | 45,667 | 35,000 | 38,667 | 41,000 | 46,713 | 44,000 |
| ■ Lead Systems Analyst | 36,381 | 44,750 | 53,800 | 35,000 | 40,560 | 41,200 | 46,000 |
| ■ Systems Analyst | 32,197 | 35,600 | NA | 36,000 | 37,000 | 34,643 | 36,625 |
| ■ Junior Systems Analyst | 26,003 | 27,750 | NA | 28,500 | NA | 29,200 | 28,000 |
| **APPLICATIONS PROGRAMMING** | | | | | | | |
| ■ Manager | 43,753 | 44,125 | 50,000 | 44,100 | 53,333 | 51,000 | 49,250 |
| ■ Lead Application Programmer | 34,003 | 28,350 | 45,000 | 36,333 | 43,500 | 41,717 | 33,750 |
| ■ Senior Application Programmer | 31,856 | 25,026 | NA | 33,900 | 38,250 | 39,333 | 31,100 |
| ■ Application Programmer | 25,926 | 23,492 | 28,000 | 28,900 | 29,000 | 32,038 | 25,867 |
| ■ Intermediate Application Programmer | 23,495 | 18,010 | NA | 25,000 | 24,000 | 29,200 | 31,000 |
| ■ Junior Application Programmer | 20,410 | 16,406 | NA | 21,833 | 28,000 | 23,167 | 21,500 |
| **SYSTEMS ANALYSIS/PROGRAMMING** | | | | | | | |
| ■ Manager | 44,229 | 47,975 | 65,000 | 47,250 | 46,090 | 50,630 | 44,500 |
| ■ Lead Systems Analyst/Programmer | 36,545 | 29,260 | NA | 39,750 | 41,970 | 46,675 | 31,883 |
| ■ Senior Systems Analyst/Programmer | 33,514 | 24,461 | 36,000 | 34,129 | 31,620 | 38,000 | 35,817 |
| ■ Systems Analyst/Programmer | 29,854 | 25,505 | NA | 31,650 | 31,363 | 31,650 | 30,606 |
| ■ Intermediate Systems Analyst/Programmer | 25,632 | 17,276 | NA | 28,890 | 26,600 | 28,965 | 23,538 |
| ■ Junior Systems Analyst/Programmer | 22,021 | 23,450 | NA | 25,367 | 24,750 | 21,177 | 20,100 |
| **OPERATING SYSTEMS PROGRAMMING** | | | | | | | |
| ■ Manager | 48,453 | 58,300 | 62,500 | NA | 47,000 | 52,667 | 46,675 |
| ■ Senior Systems Programmer | 40,773 | 43,825 | 51,000 | 34,500 | 39,965 | 44,856 | 41,931 |
| ■ Intermediate Systems Programmer | 33,006 | 40,500 | NA | 33,500 | NA | 35,653 | 31,013 |
| ■ Junior Systems Programmer | 27,693 | 29,975 | 28,000 | NA | NA | 27,250 | 22,675 |
| **DATABASE ADMINISTRATION** | | | | | | | |
| ■ Manager | 47,255 | 51,500 | 65,000 | 44,000 | 48,843 | 46,800 | 33,100 |
| ■ Database Administrator | 37,357 | 47,000 | 51,000 | NA | 25,200 | 39,500 | 37,250 |
| **DATACOM/TELECOM** | | | | | | | |
| ■ Manager | 45,417 | 51,500 | 50,000 | 42,000 | NA | 42,840 | 42,000 |
| ■ Analyst | 33,087 | 39,000 | 20,000 | 37,500 | NA | 41,600 | 37,000 |
| **COMPUTER OPERATIONS** | | | | | | | |
| ■ Manager | 32,958 | 31,800 | 44,000 | 28,750 | 42,520 | 45,219 | 30,100 |
| ■ Shift Supervisor | 26,236 | 24,934 | 25,000 | 26,000 | 33,500 | 32,000 | 29,667 |
| ■ Lead Computer Operator | 20,563 | 19,991 | NA | 22,167 | 23,122 | 25,776 | 21,467 |
| ■ Computer Operator | 17,699 | 15,831 | 18,000 | 19,068 | 20,075 | 20,339 | 16,923 |
| ■ Magnetic Media Librarian | 15,753 | 10,008 | 14,000 | 18,000 | NA | 28,000 | 18,000 |
| **PRODUCTION AND I/O CONTROL** | | | | | | | |
| ■ Supervisor | 28,499 | 36,500 | 32,000 | 28,000 | NA | 29,120 | 25,400 |
| ■ Lead Production Controller | 24,309 | 25,000 | 50,000 | 25,000 | 16,200 | 26,667 | 29,000 |
| ■ Scheduler | 21,814 | 35,000 | 22,000 | 16,000 | NA | 26,500 | 19,580 |
| ■ Control Clerk | 16,359 | 20,000 | NA | 13,580 | 17,400 | 20,450 | 16,446 |
| **DATA ENTRY** | | | | | | | |
| ■ Supervisor | 20,720 | 22,400 | 30,000 | 26,400 | 24,959 | 22,346 | 16,737 |
| ■ Operator | 14,958 | 16,617 | 17,000 | 14,917 | 16,064 | 15,447 | 13,995 |
| **OFFICE AUTOMATION** | | | | | | | |
| ■ Word Processing Supervisor | 24,144 | 21,000 | NA | 35,000 | 22,460 | 31,000 | 35,000 |
| ■ Word Processing Operator | 15,495 | 15,167 | NA | 25,000 | 14,867 | 19,728 | 13,625 |
| ■ Microcomputer User Services Specialist | 27,578 | NA | NA | 34,000 | 31,002 | 26,865 | 32,117 |
| **DOCUMENTATION** | | | | | | | |
| ■ Specialists | 23,707 | 22,750 | NA | 31,500 | 25,667 | 36,000 | 24,000 |
| ■ Consultant | 43,512 | NA | 50,000 | NA | 64,000 | 55,000 | 46,125 |
| ■ Pc Evaluator | 29,739 | 26,000 | NA | 25,000 | NA | 50,000 | 45,000 |

| HOUS-TON | DENVER | DALLAS | CHI | MINN/ ST. PL | CLEVE | CIN/ COL | DTRT | ST. LOU | SEATL | SAN FRAN | LOS ANGEL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 64,000 | 51,500 | 67,000 | 69,750 | 74,300 | 99,000 | 71,000 | 60,000 | 99,999 | NA | 56,333 | 65,343 |
| 63,025 | 37,900 | 50,667 | 54,458 | 56,271 | 72,500 | 47,714 | 51,332 | 50,286 | 50,443 | 65,520 | 55,282 |
| 58,000 | 30,000 | 55,252 | 44,714 | 50,380 | 75,000 | 48,500 | 43,000 | 48,500 | NA | NA | 50,000 |
| 40,000 | 32,000 | 36,076 | 51,857 | 50,292 | 31,384 | 35,000 | NA | 39,500 | 39,850 | 39,667 | 39,500 |
| NA | NA | 32,500 | 67,000 | 35,550 | 75,000 | NA | NA | 48,000 | NA | NA | 40,000 |
| 48,500 | NA | NA | 45,333 | 41,000 | 75,000 | 45,500 | 45,195 | NA | NA | 56,333 | 46,500 |
| 41,833 | 25,500 | 48,800 | 39,000 | 37,500 | 49,250 | 20,000 | 39,138 | 35,000 | 39,000 | 33,000 | 42,371 |
| NA | NA | 38,000 | NA | 31,667 | 45,000 | 35,000 | 32,500 | NA | NA | NA | NA |
| 32,000 | NA | 32,750 | 31,894 | 29,667 | 35,000 | 31,500 | 33,530 | 21,000 | NA | 35,000 | 38,600 |
| 30,000 | NA | NA | 25,500 | 23,500 | 28,000 | NA | NA | NA | NA | NA | 24,000 |
| 44,750 | NA | 45,250 | 39,750 | 42,000 | 41,867 | 39,000 | 44,276 | 38,000 | 48,376 | 62,000 | 37,500 |
| 43,200 | NA | 30,000 | 36,500 | 34,333 | NA | 26,500 | 36,406 | NA | 45,000 | NA | 41,000 |
| 37,700 | 26,400 | 25,000 | 35,000 | 32,674 | 24,000 | 28,000 | 35,302 | 35,000 | 38,000 | 32,750 | 32,500 |
| 32,067 | 26,033 | 24,000 | 26,300 | 29,500 | 22,750 | 24,083 | 31,000 | 23,000 | 28,967 | 34,250 | 27,000 |
| NA | 24,300 | 26,400 | 24,000 | 25,500 | NA | NA | 29,198 | 18,000 | NA | 33,125 | 29,333 |
| NA | NA | NA | 26,000 | 21,000 | NA | 18,500 | 26,403 | 20,000 | 22,435 | NA | 23,750 |
| 52,500 | 42,500 | 48,200 | 45,638 | 44,820 | NA | NA | 40,000 | 38,067 | 32,618 | 45,125 | 49,375 |
| 43,500 | 42,000 | 42,000 | 41,600 | 37,739 | NA | 37,333 | NA | 41,000 | NA | 45,004 | 45,500 |
| 37,000 | 32,750 | 38,076 | 36,188 | 33,793 | NA | 32,750 | 33,750 | 43,500 | 36,000 | 35,000 | 35,267 |
| 30,000 | 32,000 | 30,606 | 29,455 | 32,600 | 28,000 | 26,000 | 27,750 | 26,650 | 28,427 | 32,167 | 36,120 |
| 26,000 | NA | NA | 29,625 | 29,263 | 25,000 | NA | 24,750 | 26,000 | 26,640 | NA | 30,450 |
| NA | 24,500 | 26,250 | 26,140 | 22,540 | NA | NA | NA | 24,500 | NA | NA | 23,250 |
| 40,000 | 50,000 | 56,785 | 54,225 | 43,335 | 75,000 | NA | NA | 50,000 | 29,082 | 56,000 | 55,833 |
| 37,000 | 32,000 | 47,050 | 41,667 | 46,440 | NA | 33,000 | 45,000 | 42,750 | NA | 35,000 | 46,800 |
| 30,000 | 37,000 | 42,050 | 30,833 | 39,856 | NA | 26,000 | 28,000 | 31,333 | 25,121 | 30,000 | 48,000 |
| NA | 20,400 | 35,762 | 26,417 | 28,887 | NA | NA | 25,000 | NA | NA | 25,000 | 32,000 |
| NA | NA | NA | 44,450 | 48,000 | 28,000 | 37,000 | NA | NA | NA | 52,500 | 56,000 |
| NA | 28,500 | NA | 35,200 | 40,925 | NA | NA | NA | 30,000 | 39,500 | 32,000 | 41,000 |
| 60,000 | NA | 42,000 | 57,300 | 44,015 | NA | 40,000 | 52,000 | 45,000 | 25,000 | 55,000 | 50,333 |
| 38,000 | 26,500 | 39,003 | 40,750 | 31,250 | NA | 22,000 | 28,079 | 29,000 | NA | 30,000 | 31,000 |
| 29,750 | 32,000 | 32,750 | 33,885 | 37,483 | 38,500 | 36,667 | 29,851 | 48,000 | 31,626 | 43,448 | 38,727 |
| 28,000 | 30,000 | 22,500 | 28,500 | 30,073 | NA | 22,333 | NA | 28,233 | 27,444 | 25,750 | 28,617 |
| 26,333 | 22,738 | 19,462 | 21,580 | 24,256 | 20,000 | 21,000 | 19,251 | 22,320 | 18,980 | 21,569 | 21,844 |
| 24,000 | 17,767 | 17,750 | 18,907 | 18,693 | 16,283 | 16,710 | 16,063 | 16,771 | 22,055 | 21,821 | 21,606 |
| NA | NA | 18,200 | 13,100 | 16,500 | NA | NA | NA | 15,000 | 15,528 | NA | NA |
| 36,750 | 28,000 | 26,360 | 55,600 | 38,268 | NA | 29,500 | 25,000 | 26,000 | NA | 36,000 | 29,000 |
| 24,000 | 25,000 | 25,900 | 17,500 | 24,258 | NA | NA | NA | 25,000 | NA | NA | NA |
| 20,000 | 22,000 | 22,880 | NA | 26,750 | NA | 26,000 | 12,000 | NA | 16,334 | NA | 26,000 |
| NA | 19,000 | 13,236 | 15,333 | 22,581 | NA | NA | 20,074 | 19,083 | NA | 15,120 | 19,467 |
| 20,500 | NA | 26,484 | 22,000 | 31,741 | 25,000 | 17,000 | 20,820 | 22,167 | 20,198 | 17,050 | 23,600 |
| 19,000 | 16,722 | 15,848 | 16,690 | 15,772 | 14,100 | 15,250 | 15,562 | 17,813 | 16,193 | 17,667 | 16,589 |
| NA | NA | 35,452 | 23,167 | 24,659 | NA | 19,750 | 19,600 | 16,000 | 19,500 | 27,000 | 31,000 |
| 14,000 | NA | 15,300 | 14,833 | 17,467 | 14,000 | 16,000 | 13,750 | 13,500 | 13,250 | 19,200 | 19,000 |
| 38,000 | 22,750 | 36,367 | 18,833 | NA | NA | NA | 29,967 | 36,000 | NA | 26,000 | 27,000 |
| 27,000 | 25,500 | 22,250 | 30,000 | NA | NA | 10,000 | NA | 18,000 | NA | 18,000 | 37,250 |
| 40,000 | 38,500 | 34,152 | 50,000 | NA | NA | NA | NA | NA | 15,418 | 48,000 | 27,500 |
| NA | NA | 31,774 | 39,733 | 23,000 | NA | NA | NA | 15,000 | 27,000 | NA | 25,000 |

## FIGURE 4 Average Salary by Industry (in $)

| | ALL | CONSUM MFG | INDUS MFG | BANK | FINAN | DP SERV | OTHER SERV |
|---|---|---|---|---|---|---|---|
| **CORPORATE STAFF** | | | | | | | |
| ■ Vice President | 61,505 | 64,500 | 82,500 | 54,406 | 64,367 | 60,059 | 64,167 |
| ■ Director of Dp/MIS | 49,754 | 51,814 | 50,828 | 59,900 | 51,254 | 54,219 | 45,043 |
| ■ Technical Services Manager | 47,450 | 49,789 | 48,317 | 50,429 | 52,378 | 51,050 | NA |
| ■ Information Center/Data Center Manager | 41,029 | 42,211 | 41,586 | 52,463 | 37,630 | 50,000 | 43,000 |
| ■ Director of Security | 45,026 | 43,033 | 38,000 | 50,000 | 33,750 | 45,000 | NA |
| **SYSTEMS ANALYSIS** | | | | | | | |
| ■ Manager | 44,505 | 40,400 | 45,609 | 37,098 | 46,000 | 44,300 | 45,000 |
| ■ Senior Systems Analyst | 38,852 | 34,333 | 39,761 | 34,077 | 37,980 | 38,643 | 39,000 |
| ■ Lead Systems Analyst | 36,381 | 41,933 | 35,927 | 36,250 | 28,500 | 40,600 | NA |
| ■ Systems Analyst | 32,197 | 32,250 | 31,900 | 25,194 | 28,840 | 33,111 | 30,500 |
| ■ Junior Systems Analyst | 26,003 | 25,000 | 26,000 | 25,545 | 26,500 | 27,000 | NA |
| **APPLICATIONS PROGRAMMING** | | | | | | | |
| ■ Manager | 43,753 | 44,330 | 43,517 | 42,860 | 40,679 | 46,900 | 36,000 |
| ■ Lead Application Programmer | 34,003 | 31,011 | 37,190 | 35,333 | 33,400 | 39,167 | 34,000 |
| ■ Senior Application Programmer | 31,856 | 28,933 | 33,001 | 34,625 | 29,500 | 32,904 | 26,250 |
| ■ Application Programmer | 25,926 | 26,546 | 26,533 | 23,063 | 24,558 | 28,344 | 24,198 |
| ■ Intermediate Application Programmer | 23,495 | 22,500 | 23,983 | 23,333 | 23,250 | 26,400 | 20,580 |
| ■ Junior Application Programmer | 20,410 | 16,833 | 22,756 | 21,500 | 20,000 | 20,936 | 30,000 |
| **SYSTEMS ANALYSIS/PROGRAMMING** | | | | | | | |
| ■ Manager | 44,229 | 41,618 | 43,204 | 49,422 | 51,567 | 47,750 | 40,500 |
| ■ Lead Systems Analyst/Programmer | 36,545 | 33,646 | 37,548 | 39,263 | 42,875 | 55,000 | 34,500 |
| ■ Senior Systems Analyst/Programmer | 33,514 | 31,022 | 35,105 | 32,892 | 31,460 | 38,444 | 31,360 |
| ■ Systems Analyst/Programmer | 29,854 | 26,967 | 31,730 | 27,725 | 28,444 | 32,117 | 27,667 |
| ■ Intermediate Systems Analyst/Programmer | 25,632 | 26,983 | 26,037 | 25,248 | 27,350 | 25,286 | 23,000 |
| ■ Junior Systems Analyst/Programmer | 22,021 | 22,311 | 21,611 | 21,330 | 25,500 | 24,375 | NA |
| **OPERATING SYSTEMS PROGRAMMING** | | | | | | | |
| ■ Manager | 48,453 | 49,256 | 45,090 | 51,813 | 58,118 | 50,000 | 50,000 |
| ■ Senior Systems Programmer | 40,773 | 40,310 | 41,154 | 38,514 | 44,171 | 43,500 | 36,750 |
| ■ Intermediate Systems Programmer | 33,006 | 31,354 | 30,792 | 31,011 | 39,000 | 35,833 | 37,000 |
| ■ Junior Systems Programmer | 27,693 | 25,238 | 28,258 | 28,000 | 30,671 | 23,500 | NA |
| **DATABASE ADMINISTRATION** | | | | | | | |
| ■ Manager | 47,255 | 46,243 | 49,414 | 52,000 | 48,000 | 52,500 | NA |
| ■ Database Administrator | 36,818 | 32,356 | 34,778 | 44,304 | 47,500 | 40,286 | 36,000 |
| **DATACOM/TELECOM** | | | | | | | |
| ■ Manager | 45,417 | 50,675 | 54,787 | 42,978 | 42,250 | 46,250 | NA |
| ■ Analyst | 33,087 | 30,700 | 33,167 | 26,899 | 33,784 | 35,200 | 31,000 |
| **COMPUTER OPERATIONS** | | | | | | | |
| ■ Manager | 32,958 | 33,288 | 34,216 | 33,908 | 31,370 | 36,000 | 32,167 |
| ■ Shift Supervisor | 26,236 | 29,475 | 29,080 | 23,069 | 25,600 | 31,000 | 30,000 |
| ■ Lead Computer Operator | 20,563 | 20,470 | 20,818 | 18,114 | 19,457 | 25,286 | 20,511 |
| ■ Computer Operator | 17,699 | 18,490 | 18,724 | 14,681 | 17,210 | 20,222 | 19,589 |
| ■ Magnetic Media Librarian | 15,753 | 14,000 | 16,500 | 14,167 | 17,900 | 22,500 | NA |
| **PRODUCTION AND I/O CONTROL** | | | | | | | |
| ■ Supervisor | 28,499 | 28,000 | 34,007 | 38,070 | 30,270 | 32,400 | 28,000 |
| ■ Lead Production Controller | 24,309 | 21,250 | 22,243 | 28,021 | 29,760 | 32,000 | 25,000 |
| ■ Scheduler | 21,814 | 20,333 | 16,000 | 30,355 | 23,376 | 27,333 | 22,000 |
| ■ Control Clerk | 16,359 | 16,719 | 17,269 | 14,113 | 15,559 | 19,000 | 16,500 |
| **DATA ENTRY** | | | | | | | |
| ■ Supervisor | 20,720 | 20,153 | 21,112 | 20,268 | 23,771 | 22,953 | 16,500 |
| ■ Operator | 14,958 | 14,915 | 15,867 | 12,905 | 15,547 | 17,042 | 17,000 |
| **OFFICE AUTOMATION** | | | | | | | |
| ■ Word Processing Supervisor | 24,144 | 24,189 | 25,980 | 24,500 | 25,804 | 30,800 | NA |
| ■ Word Processing Operator | 15,495 | 15,711 | 16,367 | 10,750 | 16,929 | 16,627 | NA |
| ■ Microcomputer User Services Specialist | 27,578 | 28,125 | 33,000 | 24,300 | 31,475 | 30,000 | 34,000 |
| **DOCUMENTATION** | | | | | | | |
| ■ Specialists | 23,707 | 23,400 | 22,900 | 21,103 | 20,870 | 28,500 | 19,000 |
| ■ Consultant | 43,512 | 38,000 | NA | 30,000 | 34,152 | 52,500 | 49,500 |
| ■ Pc Evaluator | 29,739 | NA | 28,000 | 29,100 | 23,399 | 41,000 | 25,000 |

| DISTRB | GOVT | MED/ LEGAL | TRANS/ UTIL | EDUCA | ANNUAL SPENDING < $1 MIL | ANNUAL SPENDING > $1 MIL |
|---|---|---|---|---|---|---|
| 61,708 | 37,700 | 48,633 | 72,500 | 46,000 | 51,271 | 71,803 |
| 50,058 | 44,951 | 45,054 | 49,083 | 41,528 | 44,503 | 58,653 |
| 43,167 | 43,983 | 41,000 | 51,875 | 36,775 | 41,159 | 49,646 |
| 39,629 | 33,550 | 36,260 | 44,875 | 37,451 | 37,209 | 44,251 |
| NA | 75,000 | NA | 40,000 | 25,950 | 46,750 | 42,464 |
| 52,500 | 43,257 | 25,000 | 47,600 | 38,750 | 39,472 | 48,459 |
| 36,250 | 40,095 | 32,500 | 39,833 | 28,800 | 35,727 | 40,960 |
| 30,000 | 35,700 | NA | 37,500 | 20,000 | 32,654 | 38,400 |
| 33,000 | 32,734 | 35,500 | 33,000 | 31,600 | 30,793 | 33,333 |
| NA | 27,389 | NA | 26,000 | 28,000 | 25,427 | 26,419 |
| 57,500 | 44,110 | 32,250 | 53,000 | 30,584 | 41,673 | 44,749 |
| 30,508 | 37,846 | 24,000 | 29,130 | 27,667 | 30,769 | 35,568 |
| 29,016 | 35,071 | 30,530 | 25,311 | 27,880 | 29,327 | 34,061 |
| 26,875 | 28,348 | 22,675 | 21,488 | 23,307 | 24,819 | 27,298 |
| 15,300 | 27,733 | 18,500 | 18,010 | 23,257 | 22,406 | 24,352 |
| 17,274 | 22,343 | 19,600 | 13,674 | 19,232 | 20,680 | 20,233 |
| 36,750 | 35,817 | 35,613 | 44,600 | 45,084 | 38,256 | 48,454 |
| 39,320 | 32,978 | 22,000 | 33,262 | 31,507 | 33,211 | 39,787 |
| 35,167 | 31,324 | 31,000 | 31,309 | 28,804 | 31,970 | 35,161 |
| 29,833 | 25,493 | 27,500 | 26,605 | 27,751 | 28,480 | 30,912 |
| 24,000 | 24,585 | 23,000 | 20,507 | 23,628 | 24,401 | 26,345 |
| 17,567 | 17,493 | NA | 23,400 | 21,124 | 20,316 | 23,386 |
| 42,500 | 31,760 | 39,000 | 50,000 | 37,416 | 36,756 | 50,876 |
| 36,500 | 38,591 | 31,200 | 41,720 | 35,196 | 39,099 | 41,300 |
| 30,000 | 29,384 | 28,000 | 37,500 | 26,029 | 31,600 | 33,292 |
| 20,000 | 26,077 | 22,500 | 33,533 | 27,233 | 26,108 | 28,444 |
| 51,000 | 43,600 | 18,000 | 53,467 | 30,650 | 35,600 | 50,393 |
| 37,250 | 35,389 | 40,500 | 38,560 | 36,100 | 33,393 | 37,959 |
| 31,500 | 40,733 | 32,000 | 50,000 | 33,000 | 41,171 | 45,876 |
| NA | 32,040 | NA | 36,000 | NA | 31,833 | 33,101 |
| 26,111 | 36,646 | 27,083 | 31,755 | 29,824 | 28,469 | 36,500 |
| 23,250 | 25,176 | 19,750 | 26,679 | 23,631 | 25,389 | 26,705 |
| 19,001 | 21,169 | 19,082 | 21,828 | 17,822 | 19,348 | 22,162 |
| 16,639 | 17,254 | 15,835 | 18,780 | 16,452 | 16,824 | 18,877 |
| 17,000 | 15,000 | NA | 12,005 | 12,764 | 22,000 | 15,254 |
| 25,000 | 24,574 | 20,225 | 33,000 | 21,000 | 25,067 | 29,704 |
| 19,000 | 28,000 | 20,000 | NA | 15,333 | 22,417 | 24,849 |
| 18,000 | 21,075 | NA | 26,000 | 17,411 | 20,400 | 22,167 |
| 15,500 | 17,089 | 15,500 | 24,000 | 15,467 | 15,775 | 16,578 |
| 20,200 | 18,152 | 19,767 | 21,250 | 15,599 | 18,837 | 22,623 |
| 14,351 | 14,293 | 13,534 | 17,900 | 13,013 | 14,766 | 15,404 |
| NA | 17,931 | 27,500 | 19,000 | NA | 22,825 | 25,094 |
| 13,756 | 14,525 | 17,167 | 16,500 | 20,060 | 14,870 | 16,485 |
| 23,000 | 28,009 | 31,226 | 21,000 | 23,006 | 27,529 | 27,787 |
| 19,000 | NA | 14,800 | NA | 28,000 | 19,693 | 25,715 |
| 25,060 | 40,000 | 30,000 | 65,000 | 23,934 | 48,214 | 37,902 |
| 27,000 | 21,005 | NA | 50,000 | 18,000 | 26,225 | 30,617 |

jobs and not enough people."

For other jobs in other places, there are plenty of people. Foulds of St. Anthony's Hospital told DATAMATION that he has just finished hiring an operations manager. "We put the ad in the paper just locally and I must have gotten at least 80 résumés." Foulds says that most of the applicants already had jobs.

He points up one constant in the salary data: some industries pay a lot better than others. "The hospital pay rate for dp people is a tad bit lower than in general manufacturing," he says. Indeed it is. Looking at the 47 job titles surveyed, in 13 job positions the lowest average salaries were found in education. In nine positions, the lowest average salaries were in the medical or legal fields. Government pays the lowest average in six job positions. Banking is lowest payer in six others. The bottom payers in the other 13 positions were split between transportation with six; distribution with four; consumer manufacturing with two; and industrial manufacturing with one.

The survey revealed that perks remain important in the overall scheme, with some improvement in their availability from previous years. Almost 95% of all IS workers are covered for medical and dental expenses and get paid vacations. Almost 90% get company-provided life insurance, and are eligible for company disability and pension plans. About 60% get overtime pay. A significant change in the results of this year's survey is found in the response to questions about profit sharing and investment plans: in the 1986 survey, only about 40% of the companies sampled offered these incentives; this year, almost 90% offer investment plans and more than 70% offer profit sharing.

A striking difference in this year's sample is in the average number of full-time employees in MIS departments. In last year's survey, the average was 65.6; in this year's it is 78.3. Foulds at St. Anthony's reports that his staff grew last year because the hospital had gotten rid of a facilities management team and replaced independent contractors with full-time employees. "The hospital wanted to take internal control of its data processing," he explains.

Foulds is not the only MIS chief to replace temporary employees with full-time employees. This trend was one of the most vividly apparent in this year's survey. In last year's survey, managers reported that in 1985 they had employed an average of 11.5 temporary employees per site. For 1986, they didn't plan much

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change, predicting they'd have used 11.6 temporary employees by year's end. But the 1986 survey showed that each sampled site had actually averaged 7.6 temps, more than a third fewer temporary employees than had been reported in last year's survey. Forecasts for 1987's total—8.6 per site—are a bit up from this year, but still nowhere near the 1985 high point.

Some of this shift may be due to managers seeking—like Foulds—to "take control" of their staffs. But Joe Mohen, who runs Teleprocessing Conection, a small, five-person firm in Garden City, N.Y., that specializes in LU 6.2 implementation, says the Tax Reform Act is to blame. Section 1706 of the reform bill effectively removed the "safe harbor" in which so-called independent contractors were able to shelter some tax advantages over their salaried coworkers.

"An element of risk is perceived," says Mohen. "If you utilize temporary help from a small contracting firm, you now must fear that the independent contractors could be deemed your own common-law employees, the IRS holding you retroactively responsible for the personal income tax payments. It is only going to get worse. The Pandora's box of IRS witch-hunts has been opened."

George Werner, owner of GMW Associates in New York, a company that used to supply independent contract workers to IS operations, thinks some of the drop in temporary workers is due to business conditions. "When the banks took write-offs for bad debts, they cut costs. When people cut back, the first to go are independent contractors." But Werner adds that many IS people who once sold their services as independent contractors are now taking full-time jobs with primary employers.

One final note. If you're thinking of looking for big bucks as a high-tech exec, this might not be the year to move: according to the National Index of Executive Vacancies released by Korn/Ferry International, a New York executive search firm, high-technology hiring at the upper levels is down slightly from last year. In the survey released in late July, executive demand at technology companies accounted for 13% of total national executive demand; last year at this time, high technology accounted for 14% of demand. ■

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